REMARKS

Pending Claims

Claims 11-12, 14-17, 19-22 and 24-30 are pending in this application. Claims 1, 16, 21, 24 and 27 have been amended. No new matter has been added.

Claim Rejections under 35 U.S.C. §103

Claims 11-12, 14-17, 19-22 and 24-30 are rejected under 35 U.S.C. §103(a) as being unpatentable over Milligan et al., U.S. Patent No. 5,210,866 and further in view of Bachmat et al., U.S. Patent No. 6,237,063.

Applicants have amended each independent claim to clarify that which they regard as the invention. In particular, the setting of a value of a device busy request of positional information to indicate busy is set forth in each of the amended claims. For example, in claim 1 Applicants have amended the claim to further recite that the storage system sets a value of a device busy request of the positional information of each of the first logical volume and the second logical volume to indicate busy when the storage system receives the swap request from the host computer. Likewise, independent claims 16, 21, 24 and 27 have each been amended for consistency to set forth similar recitations as found in claim 1.

According to claim 1, the computer system comprises a host computer and a storage system which stores data to be accessed by the host computer, wherein the storage system includes a first physical storage area in one or more disks in the storage system and a controller for accessing the one or more disks. The first physical storage area corresponds to a first logical volume accessed by the host computer. Further, the

host computer stores data in the first physical storage area and a backup copy of the data is stored to a tape at a certain point in time. After the certain point in time and upon occurrence of a failure in a sequence of processing executed by the host computer, the host computer selects an unused second logical volume in the storage system, where the second logical volume corresponds to a second physical storage area, reads the backup copy from the tape and writes the backup copy of the data to the second logical volume. The host instructs the controller to relate the second logical volume in the second physical storage area to the first logical volume in the first physical storage area according to a swap request by exchanging positional information of the first logical volume with that of the second logical volume, so that data of the first logical volume is interchanged with data of the second logical volume. The controller then accesses the second physical storage area when the controller receives an access request to the first logical volume from the host computer. Additionally, according to the amendment made to claim 1, the storage system sets a value of a device busy request of said positional information of each of the first and second logical volumes to indicate busy when the storage system receives the swap request from the host computer.

Support for the amendments to the claims is made with reference to Figures 13-16. For example, Fig. 13 shows a host 101 coupled with a disk subsystem having a control processor 1505 and control memory 1506 which stores positional information 1509. *See* para. [0133] – [0143] of 2005-0251517 A1, for example. The disk subsystem additionally has physical volumes 1508a, 1508b, and 1508n for storing data to be accessed by the host. The positional information 1509 stored in the control memory 1506 includes a device busy request 1801 indicating that "device busy" is reported in

response to an access from host 101 to a logical volume identified by logical volume number 1800. *See* para. [0143] of 2005-0251517 A1, for example. Furthermore, setting the device busy request 2007 occurs when the storage system receives a swap request 2001 from the host computer 101. *See* Fig. 15 and para. [0150] of 2005-0251517 A1, for example. Thus, according to a feature of the present invention, it is determined whether any subsequent read/write requests are directed to a logical volume number 1800 having a corresponding device busy request which is set to busy. If the value indicates busy then the disk subsystem reports to the host computer 101 that the device is busy and terminates further processing of the read/write request, thereby limiting access by the host to the requested logical volume. *See* para [0154] of 2005-0251517 A1, for example.

Milligan is relied upon in the Office Action to teach data recovery in the case of processing failure. Milligan discloses a host computer and a data storage subsystem with a plurality of disk drives, where modified data records are stored in a cache and when it is determined a sufficient number of modified data records have been stored in the cache, they are written out as an entire logical track and original data records are tagged as obsolete. *See* col. 2, lines 1-16. Additionally, Milligan is relied upon in the Office Action to disclose wherein the host instructs the controller to relate the second logical volume in the second physical storage area to the first logical volume in the first physical storage area according to a swap request by exchanging positional information of the first logical volume with that of the second logical volume, so that the controller accesses the second physical storage area when the controller receives an access request to the first logical volume from the host computer. However, as recognized in the

Office Action, Milligan fails to disclose where the data of the first logical volume is interchanged with the data in the second logical volume, as claimed by Applicants.

In addition, Milligan fails to disclose where the storage system sets a value of a device busy request of the positional information on each of the first and second logical volumes to indicate busy when the storage system receives a swap request from the host computer, as claimed by Applicants. Instead, Milligan discloses updating a virtual track instance into a logical unit and placing the new location of the virtual track in the logical map so that it may be available to the host processors. Milligan further discloses that the control unit then marks the virtual track instance that is stored in the redundant group as obsolete (710) to prevent the logical location at which the virtual track instance is stored from being accessed during a read or write request by another host. *See* Fig. 7 and col.18, lines 6-24. Accordingly, Milligan fails to disclose the claimed combination as set forth in claims 11, 16, 21, 24, and 27.

Bachmat is further relied upon in the Office Action to supplement Milligan by disclosing a swap/switch process wherein the swapping/switching of data to a spare/unused logical volume occurs in order to backup data in case of a processing failure by the host. Bachmat is directed to a load balancing method, which is controlled by a system manager console, on storage disks to manage the device load associated with physical volumes by monitoring read/write operations on the physical volumes corresponding logical volume. *See* Abstract and col. 8, lines 32-43. The load balancing, as disclosed in Bachmat, occurs with respect to a plurality of physical storage disks which are divided into a plurality of logical volumes for storing data where disk access statistics are recorded for the logical volumes in order to determine the first and second

logical volumes to be exchanged. In particular, the exchange occurs by transferring the data on the first and second logical volumes which are located at first and second physical volumes through first and second buffers. *See* col. 3, lines 29-45. As disclosed in Bachmat, the exchange has the purpose of reducing the load on a physical disk by swapping a high activity logical volume stored on a first physical volume with a low activity logical volume stored on a second physical volume. *See* col. 8, lines 32-43.

On the other hand, as claimed by Applicants, in accordance with receiving a swap request, the host instructs the controller to relate the second logical volume to the first logical volume by exchanging positional information of the first logical volume with the second logical volume, so that data of the first logical volume is interchanged with data of the second logical volume. Further, the controller accesses the second physical storage area when the controller receives an access request from the host computer to the first logical volume. Additionally, the storage system sets the value of a device busy request of the positional information of each of the first logical volume and the second logical volume to indicate busy when the storage system receives said the request from the host, as claimed by Applicants. Accordingly, Bachmat fails to overcome the abovementioned deficiencies noted in Milligan and recognized in the Office Action.

In view of the foregoing remarks and amendments, Applicants submit that the combination of Milligan in view of Bachmat fails to render unpatentable claims 11, 12, 14-17, 19-22, 24-30.

Conclusion

In view of the foregoing, Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

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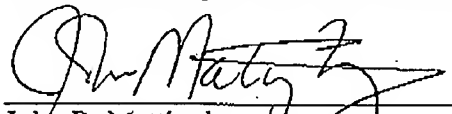

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